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ance of colleges and universities upon the Carnegie Foundation, for the payment of professors' retiring allowances, should act as a serious limitation upon their independence in matters of educational policy. Harvard University, for example, may be drawing from the foundation fifty thousand dollars a year, at some future date, and its entire budget will naturally be prepared in reliance upon this important contribution; beyond that, every member of the faculty will be adjusting his living expenses with a view to drawing a pension from the foundation after he reaches the retiring age. Is it not inevitable that, without necessarily taking an abject attitude toward the foundation, the authorities of Harvard University should be consciously or unconsciously influenced in the directions favored by this large benefactor? Would they not naturally hesitate to incur the displeasure of so powerful a friend? Would such a degree of dependence be agreeable for the graduates and other friends of the university to contemplate? Such questions as these have suggested themselves to many minds since the establishment of the Carnegie Foundation; and they have lately given place in some quarters to emphatic expressions of discontent.

The *Bulletin* does not share these apprehensions. The Carnegie Foundation is controlled by a board of trustees who delegate a share of their authority to a small executive committee. This committee, in turn, has been guided largely by the very able president of the foundation, its chief administrative and executive officer. During the first years of the foundation the initiative of the president has naturally been a large factor in determining the scope of its activities. But admitting all this, the power remains vested in the board of trustees, a body consisting mainly of college and university presidents who represent a considerable variety mainly of institutions. For some years President Eliot was chairman of the board. . . .

It is reasonable to expect that in setting its standards of admission to the pension privilege the foundation will make from time to time certain moderate minimum requirements of

which no healthy institution once admitted can ever complain. As for the investigations and reports and the measuring out of praise or blame, this branch of the foundation's activities will have whatever weight may be derived from the intelligence, impartiality and public spirit of its officers. Taking into account the manner in which the board of trustees is constituted it would have been no unprecedented result if the reports of the foundation had been of a purely academic nature, calculated to preserve that self-satisfied attitude into which educational institutions often fall. That, on the contrary, the foundation has examined carefully and criticised fearlessly, is, in spite of all the mistakes of fact or errors of judgment its reports may contain, a cause for general congratulation. The good effects upon higher education throughout the country are already visible.—*The Harvard Bulletin*.

SCIENTIFIC BOOKS

Preliminary General Catalogue of 6,188 Stars for the Epoch 1900. Prepared by LEWIS BOSS. Published by the Carnegie Institution of Washington, 1910.

This handsome quarto volume is surely no aspirant for popular favor. Ninety per cent. of its bulk is given up to closely printed numerical tables of forbidding aspect to the average reader even of scientific works, and the forty pages of accompanying text will prove a meager diet to the amateur solicitous over the inhabitants of Mars or the terrestrial influence of comets. But, to that limited class of professional astronomers interested in problems of stellar motion, the work must appear as one of singular interest and importance, marking a stage of advancement rendered possible only by a happy union of the ample material resources of the Carnegie Institution with the large experience and assiduity of the veteran author.

The major portion of the work, a scant 250 pages, sets forth by means of half a million figures and other mathematical symbols the positions and apparent motions for rather

more than six thousand stars, about one third of which are of telescopic faintness, while the remaining two thirds constitute by far the larger part of all stars visible to the unaided eye. The purpose realized in these pages is set forth substantially as follows: Primarily to give the proper motions of the stars as they result from a precise discussion of all readily available observations; and secondarily, to furnish a Standard Catalogue that shall be practically exhaustive of available material both in extent and in thoroughness of discussion. The right ascensions of the stars are freed from the effect of magnitude error and for both coordinates means are furnished for an estimate of the probable errors of the star places at any future epoch, to which they may be projected by means of the elements of their motion presented in the catalogue.

For about a century and a half a large part of the working force of every generation of astronomers has been given to determining with minute precision the positions in the sky severally occupied by the so-called fixed stars and, from time to time, these observations have been in part calculated and discussed with varying degrees of thoroughness, to determine the changes in these positions, that accrue with lapse of time. The British Association Catalogue of Stars represented in the first half of the nineteenth century the high-water mark of such utilization of the raw material furnished by the observing astronomer and, in our own day, the catalogues of Auwers and Newcomb represent in more limited scope but with greatly augmented precision, the advance achieved in this direction.

The diminished scope of the more modern compilations is doubtless due in part to the growing burden of treating a greatly increased body of observations, but in even greater measure it is due to the adoption of higher standards of precision, that can be met only in the case of those few stars that have been longest and best observed. It is therefore noteworthy that the present catalogue comprising about four times as many stars as its nearest rival (Newcomb) is announced by its author as being the first installment of a work that, when complete, will furnish the positions and

motions of some 25,000 stars observed and discussed with a completeness hitherto attained only within the very restricted lists above noted, 1,596 stars in Newcomb's catalogue. While much of the program thus announced depends for its realization upon observations and discussions still to be made, the present completed volume probably represents the larger part of the total task, since in it there is established the fundamental system of star places to which all else is to be conformed.

It is well understood that every set of observations made with a given instrument by a given man, or set of men, contains minute errors of a systematic character peculiar to itself, and any catalogue constructed from many and divers sets of such observations must present a veritable mosaic of these inherent errors, that may completely mask or vitiate such minute quantities as the concluded proper motions of the stars. For the detection and elimination of these systematic errors of the data, Boss has collated the more important series of observations made in the nineteenth century, about eighty in number, and by intercomparison, checking one against another, has reached tentative conclusions with regard to the corrections that must be applied to each in order to adjust it to the standard fixed by the combined body of data. Applying these corrections and averaging the results, there is obtained the system of star places to which reference is above made, and as a by-product the relative measure of credence to be assigned these several authorities, *i. e.*, their combining weights, in the formation of a catalogue. It is of some interest to note that by comparison with the system of star places less elaborately developed by the late Professor Newcomb, Boss's stars in the regions adjacent to the equinoxes are south and west of the positions assigned them by Newcomb by amounts that will average three or four tenths of a second of arc, and presumably discordances of comparable amount obtain in other regions.

The normal type of star catalogue has become so well established as to leave scant room for variation, but a unique feature of the

present work is a suggested method for incorporating, with due weight, observations additional to those upon which the catalogue results are based, thus, for a time at least, keeping it abreast of ever accruing observation. In contrast with this laudable innovation is the author's marked conservatism at other points, *e. g.*, in adhering to the system of star magnitudes established by Argelander in preference to the results of more modern photometric research, and in refusing to credit, even when extraneously confirmed, the result of his own investigation, that the fainter component of a binary star may be more massive than its brighter companion.

But criticism of the volume must be of very minor character and extent. In plan and execution the work must long stand as a monument to its distinguished author and a worthy first fruit of the Department of Meridian Astrometry of the Carnegie Institution of Washington, destined to stand as the court of first instance for the determination of disputed matters of stellar motion, such as the excessive average motion of stars remote from the galaxy; the two group theory of the stellar system, etc. While in the volume itself, a prudent reticence is maintained with respect to such applications, there is extraneous suggestion of discord to come.

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SPECIAL ARTICLES

A STUDY OF THE METHODS OF DETERMINING FAME

SOME time ago I became interested in the study of historiometry (quantitative history). In this connection I undertook some research work in the family records of celebrated Americans along lines laid down by Dr. F. A. Woods in his "Heredity in Royalty" (New York, 1906).

The question at once arose, which are the hundred, the seventy-five, or the fifty leading American names? In short, which families should be studied? The object in seeking the leading names, of course, was not the list *per se* but to secure a basis for further study. This study will include the traits and char-

acteristics of ancestors and descendants, their birthplaces, education, achievements, etc. The material lies for the most part in histories and biographies. These "measurements in history" statistically and objectively treated, and followed by scientific analysis of causes, constitute "historiometry." (Woods.)¹

The Hall of Fame movement, so far as it goes, would seem on account of the remarkable personnel of the electors, their geographical distribution and other considerations, to afford an easy way out of the difficulty. Undoubtedly the electors have done a great work which in general the thinking public must accept. Certain peculiarities disclosed in the Hall of Fame reports, however, together with the fact that the Hall of Fame selections include only a very limited number of names, led to a search for some other methods of rating fame. Several objective methods have been proposed. A desire to learn how some of these methods compare, led myself and others to undertake a test by means of tabular comparison.

We thought it would be instructive to compare the Hall of Fame electoral votes with two objective methods. The first method taken was a so-called adjective method and the second was the space method. The "adjective method" of determining fame, as we applied it, consists in simply counting the descriptive adjectives of praise applied to the name in a given work or number of works. The adjective method in another form has been successfully employed by Woods. The space method consists in counting the lines of space devoted to this name in a given work or group of works. This method has been successfully employed by Cattell and Ellis.

Upon referring to the totals of the votes cast by the electors we find that 50 American-born men have received more than 30 votes (in case a name has been voted on twice, the second total only is considered here). The four reference titles chosen as being fairly representative were Lippincott's "Pronouncing Biographical Dictionary" (Thomas), Jameson's "Dictionary of U. S. History,"

¹ See SCIENCE, November 19, 1909.